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REPORT AND RECOMMENDATIONS

of the  
First Meeting of the

ANIMAL AND ANIMAL PRODUCTS RESEARCH ADVISORY COMMITTEE

February 17-21, 1964  
Washington, D. C.

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## PREFACE

The first meeting of the Animal and Animal Products Research Advisory Committee was held in Washington, D. C., February 17-21, 1964. This committee is comprised of members from four previous committees - dairy, livestock, poultry, and sheep and wool - which were merged pursuant to the Secretary of Agriculture's Memorandum No. 1544 dated August 26, 1964. This directive also provided for a public session. Dr. N. C. Brady, Director of Science and Education, served as chairman and Dr. H. C. Trelogan, Administrator, Statistical Reporting Service, served as vice chairman.

Members of two national agricultural committees also attended as liaison representatives. They were Lyman McKee, a dairyman from Madison, Wisconsin, and Dr. J. K. Loosli, professor of animal nutrition at Cornell University, representing the National Agricultural Research Advisory Committee and the Committee on Agricultural Science, respectively.

During the public session held February 17, 1964, the following persons made statements pertaining to research needs: George Nichols, National Assn. of Artificial Breeders; Dr. L. Meyer Jones, American Veterinary Medical Assn.; Fred J. Greiner as spokesman for the Special Dairy Industry Board and as representative for the Evaporated Milk Assn.; E. L. Peterson, Milk Industry Foundation; Dan Jacobson, American Dairy Assn.; Don Turnbull as spokesman for the Associated Poultry Industries and representative of American Poultry and Hatchery Federation; Charles M. Quarre', American National Cattlemen's Assn.; William C. Sherman, National Livestock and Meat Board; Mylan Ross, National Livestock Producers Assn.; George M. Brauer, National Swine Growers Council; Edwin E. Marsh, National Wool Growers Assn.; Dr. E. Gaumnitz, National Cheese and Butter Institute; Robert Krueger, National Broiler Council; and Frank D. Brown, Purebred Dairy Cattle Assn. Also, several of the above persons accompanied the committee to Beltsville on February 18 to observe selected research activities.

As a basis for its recommendations and comments, the committee reviewed the research programs pertaining to animals and animal products as summarized in progress reports made available to the committee in advance of the meeting. The progress report material was supplemented by oral reports, visual materials, and discussions by program leaders of the research programs.

Following the review of prepared materials and the discussions with USDA staff members, the committee divided into five subcommittees: (1) general comments and recommendations; (2) animal husbandry and livestock engineering; (3) diseases, parasites and insects; (4) nutrition, consumer and industrial use; and (5) marketing and economics. All subcommittee recommendations were reviewed by the committee as a whole before they were approved for inclusion in the final report to be submitted to the Secretary of Agriculture.

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Additional copies of this report may be requested from Max Hinds, executive secretary, Animal and Animal Products Research Advisory Committee, Agricultural Research Service, U. S. Department of Agriculture, Washington, D. C. 20250.



## I. GENERAL COMMENTS

During the public session, representatives of industry repeatedly referred to the changes taking place in agriculture -- changing market structure, attitudes toward animal fats, the need to improve the image of agriculture to the consuming public, the need for better information regarding the use of agricultural chemicals and the need for basic research.

The committee wishes to acknowledge the many expressions and guides from representatives of the various animal and poultry groups which were presented during the public session. We have incorporated many of these ideas in the recommendations in this report. Also, we were pleased to have Dr. Brady detail the steps through which the Department's budget must go before it reaches the Congress. We applaud Dr. Brady in his drive to get more high caliber scientists in the upper salary levels because the committee recognizes with him that these are the men who can help bring about solutions to the many problems presented to the committee during its meeting.

### Guide for Redirection of Research

We recognize the problems of research administrators in trying to meet the demand for additional research which far outdistances the availability of resources with which to carry it out. Our recommendations are no exception to that pattern. We have recommended more expansion than curtailment. In the areas of work where reduced effort is recommended our guide has been to suggest withdrawal from those research activities where the private sector of the economy can now take up the results of previous basic or fundamental investigations. In applying this guide we want to take note of those activities which are of the nature and magnitude that are beyond the means of the private sector. To be more specific, we think the process of marketing agricultural products in certain locations in the United States is far more efficient today than it otherwise would have been because of work in area planning carried on a number of years ago by a small group of pioneers in the USDA which led to the redesign and location of marketing facilities in such cities as Philadelphia and Boston. The aggravation caused by traffic congestion and obsolete facilities slowly increased over the years until an efficient operation was almost impossible. This problem was of such magnitude that private groups were unable to overcome it. Because problems of this nature affect so many individuals and community interests -- their very nature makes them a public concern. We are concerned because the products of animal agriculture flow through these marketing channels and the efficiency of this flow can be very significant to agriculture.



### A Single Voice for Related Interests

The committee noted a development that has considerable merit in dealing with problems of a particular specie or industry group, namely, the organized groups such as the Special Dairy Industry Board which provided a voice for many dairy interests and the Associated Poultry and Egg Industries which likewise provided a voice for groups within the poultry industry. The reason for noting this development is that in dealing with future problems of animal agriculture, which is the responsibility of this committee, it will be helpful to have a consensus of the thinking of the various components of the particular segment of agriculture faced with a common problem.

### USDA Research Benefits Consumers

The changes in consumer attitudes are a result of an adequate and expanding food supply and the change from a producer-oriented distribution system to a retail- or chain store-oriented distribution system. We think the U. S. Department of Agriculture has contributed substantially to the welfare of consumers. This has been done by more efficient food production, market stabilization, human nutrition studies, consumer education, school lunch programs and through many other functions. In view of all this we are concerned about the present level of support for agricultural research. Of all Federal appropriations for research in 1940, 40% was for agriculture. In 1963, only 1.4% was for agriculture. Research in some phases of animal production has decreased. Because of research, only 19% of our disposable income now goes for food of which only 1/3 is received by the farmer. The American consumer has been the ultimate beneficiary of much of agricultural research.

### Joint Exploration of Problems by Industry and USDA

Two ideas that have emerged as a result of problems presented during the public session are offered here as general comments rather than as general recommendations because there may be difficulties involved that we do not foresee. We think there is merit in considering and exploring the problems presented by the National Livestock Producers Association relative to the changing structure and bargaining power in the marketing sector pertaining to livestock. Consideration might be given to a possible joint undertaking with such a group to carry out research cooperatively. The same approach might well be used in connection with the problem presented by the National Broiler Council which pertained to the low price of broilers during many weeks of the year and the effect this low price has on other meat products.



## II. GENERAL RECOMMENDATIONS

### Animal Fats

The committee was encouraged to see more work contemplated in human nutrition, however, since the problem of animal fats is still a major one which pervades all the different specie groups represented both on the committee and among the different organized groups which appeared at the public session, we urge that every possible effort be made to expand research and hasten the solution to this national problem.

### Public Image of Agricultural Research

Agricultural research serves the consumer by contributing to the safe, nutritious and attractive diet that our people enjoy. Research has led to increased efficiency in farming, processing, and distribution and is a major factor that has made it possible for our people to satisfy their needs for food and fiber with the expenditure of a smaller portion of their earnings than anywhere else in the world. The success of agriculture in its major objective, to provide our people with an abundance of high quality food and fiber, has been given more publicity in the past two years than previously. Further emphasis is needed with particular attention to the important contribution that agricultural research has made in the achievement of this goal.

### Basic Research

The committee is pleased with the greater emphasis on basic research at the National Agricultural Research Center and other research stations of the Department of Agriculture. A number of industry problems have already been solved by the application of basic knowledge. It is recommended that the proportion of professional man-years applied to basic research be increased. Such studies should include all phases of life, nutrition, disease control and the effects of chemicals. Knowledge of the basic cell and the processes of metabolism can aid in obtaining the answers to many problems. Knowledge of the healthy body and changes brought about by disease processes can improve the health of man and animals. Knowledge of the effect of chemicals on body processes is seriously needed; knowledge of the composition of milk, eggs, leather, fats and other animal products can lead to more effective processing methods, more satisfactory consumer products and to the development of new products. The benefits of animal agriculture and human health from increased basic research are beyond our present imagination. Basic research should cross disciplinary lines. Information developed in one area can frequently be applied in other areas. Basic information does not apply to any one specie or class of animal or products and can be used in applied research in many facets.



### Midwest Meat Animal Research Station

(See also Farm Research item 16 regarding facilities.)

The committee supports and urges the establishment of the Midwest Meat Animal Research Station that has been proposed on government land declared in excess of present needs by the Dept. of Navy near Clay Center, Nebraska.

Additional research in this area of large meat animal population and abundant production of pasture, range, forage and feed grains is needed to assist producers of livestock to meet competition and improve the efficiency of production. Research in breeding, physiology of reproduction, carcass evaluation and related feeding and management, including range studies on a regional basis is needed with beef cattle, sheep, and swine production. The proposed station on a large, suitable area of land offers an unusual opportunity to locate a sizeable group of talented scientists in adequate modern facilities, plus the essential numbers of animals to conduct research on these problems. We think it is commendable that work now conducted at three other stations can be consolidated at this new facility. Action is needed on this project while the land is available.

### Agricultural Chemicals

The committee recommends further research on agricultural chemicals. The use of agricultural chemicals has improved the quality and quantity of food available to the American consumer. Continued and increased use of agricultural chemicals in food production is essential if we are to continue to have adequate food for an expanding population. The U. S. Dept. of Agriculture and the U. S. Dept. of Health, Education and Welfare should cooperate on studies to show safe levels of pesticides in foods and should establish safe but reasonable tolerances for these chemicals and their decomposition products in all foods. This requires a knowledge of the animal metabolism of these compounds. If safe tolerances cannot be established, attempts should be made to develop new and safer compounds.

### Increased Research Relative to Other Activities Needed

The committee notes the very small part of the Agriculture Department's funds that are used for research. Further research is needed in a number of areas and the funds for research should be increased. This is especially true with research on animals for food production, human nutrition, marketing, and basic knowledge. The expenditures in these areas have not increased whereas other sciences have received large increases. This information is essential to the proper nutrition of the American public.



### Support for Scientists

It was noted that frequently scientific personnel were not adequately supported with laboratory facilities and subprofessional staff. It is recommended that supporting activities be increased so as to improve the effectiveness of the scientists employed. It is also recommended that scientific employees be adequately compensated so that the Department of Agriculture can continue to hold outstanding personnel.

### Location of Research Facilities

The Department is to be commended for locating branch research activities near universities so that the USDA scientists will be a part of a scientific community. This benefits both the USDA and the university. It also makes available to the USDA scientists resources and equipment not located in their own facilities and makes it possible for the USDA scientists to consult with other scientists in related fields.

### Opportunities for Personal Improvement of Scientists

In order to improve the quality of work and the knowledge of workers in their respective fields, we recommend that the Department take necessary steps to promote training programs to this end.

It is recommended that the Department approve travel by employees to keep abreast of new developments in their fields. Their travel should be comprehensive enough to include both domestic and foreign countries.

### National Agricultural Library

The committee is pleased that the National Agricultural Library is to be more adequately accommodated. There is a need for such a library to make available to all agricultural scientists in this country the scientific literature from all over the world.

### Research Grants

The committee commends the policy of the Department in establishing funds for grant programs in animal sciences and recommends that this program be expanded.



### III. RECOMMENDATIONS ON CURRENT PROGRAM AND NEEDED RESEARCH

#### A. FARM RESEARCH

The subcommittee that reviewed the animal disease, parasite, and insect programs expressed a view that the current research is well conceived and is providing much valuable information to the producer with its benefits extending to the consumer. The Department is to be commended for its programs in many areas especially for the research which has led to the virtual eradication of the screwworm.

##### 1. Livestock Engineering Applicable to Livestock and Poultry

Agricultural engineering has not had needed support in past years to keep its area of responsibility in proper perspective in the area of animal and animal products. We urge that more funds be made available so that major new studies may be started in environmental research. Lack of suitable environment is responsible for lowered production and uneconomical feed conversion. Existing basic and applied research needs to be strengthened and expanded to provide further information on desired environmental conditions and on engineering design criteria for structures and equipment to economically provide and maintain these conditions. Specific data are needed on the influences of the various environmental factors such as temperature, humidity, air motion, thermal radiation, and light on growth, health, fertility, production, feed consumption, heat and moisture dissipation of farm animals and poultry.

We recommend continued cooperation by the Agricultural Engineering Research Division with other divisions on work now in progress in the areas of pest and disease control and that the following projects be added: (1) Develop new ideas to solve mounting problems of animal waste disposal brought about by modern production methods, (2) establish studies to determine what part mechanical milking contributes to the incidence of mastitis, and (3) develop meters suitable for use in measuring individual cow production and meters to measure milk from farm to storage tank.

##### 2. Basic Genetic and Physiology Research

There is a need for expansion of basic genetic and physiology research on livestock and poultry to determine breeding systems and physiological mechanisms that may be applied to improve production of livestock carcasses, milk, poultry, and eggs. Special concern should be given to (a) evaluation of heritability and correlation between traits; (b) initiation of research in the field of semen preservation in order that breeding improvement techniques now available in beef and dairy cattle may be applied in swine, sheep and goats, and poultry; (c) development of improved methods of early detection of superior animals; and (d) methods of identification of progeny by blood typing or blood characteristics.



### 3. Basic Research on Metabolism and Feed Evaluation

Basic research needs to be continued and expanded on metabolism and feed evaluation. Improvement in feed efficiency depends upon increased knowledge of feed composition and the metabolic pathways by which feeds are utilized by the animal.

### 4. Effects of Feeding and Management

The effects of feeding and management on carcass characteristics and meat quality need to be studied. Only through such research can livestock and poultry producers provide the consumer with meat products having the desired characteristics.

### 5. Poisonous Plants

Research needs to be continued to identify, control and eradicate poisonous plants that cause losses in livestock production. Many thousands of acres of western range lands are infested with various poisonous plants such as halogeton, bitter weed, loco weed, and others.

### 6. Reproductive Inefficiency

Reproductive inefficiency is a problem in all species of livestock and poultry. Infertility, embryo mortality, and newborn deaths could be reduced through breeding, feeding, disease, environment, and management research.

### 7. Beef Cattle Diseases

Expanded research effort is most urgent for the following:

The respiratory disease complex appears to constitute the single greatest morbidity and mortality losses experienced in the beef cattle industry, and research on it is difficult and expensive.

Anaplasmosis, a disease caused by microscopic parasites that live in the red blood cells, is the scourge of the cattle industry in the south-central and western states.

Vibriosis, an infection of the reproductive organs of cattle, causes infertility and abortion. One of the principal difficulties encountered in its control is the diagnosis of the asymptomatic carrier state in the bull.

Foot rot resembles an infectious disease but the cause is unknown. It causes sores leading to severe lameness which reduces gains in feeding cattle, lowers milk production in dairy animals, and renders bulls useless for service.

Fescue foot is a lameness resulting from feeding on tall fescue grass or hay (also known as reed, giant, ditch bank, and king's disease). The condition resembles ergot poisoning but to date workers have been unable to incriminate the ergot fungus as a specific agent on the foliage of fescue.

## 8. Dairy Cattle Diseases

Expanded research effort is most urgent for the following:

Mastitis, an inflammation of the udder resulting from infection with micro-organisms, is the most costly disease of the dairy industry.

Metabolic disturbances, such as bloat and distress from toxic elements in plants, are responsible for substantial losses and poor performance of animals.

Pneumonia-enteritis-complex of calves is a disease of newborn calves. They get scours and later pneumonia which usually results in death.

## 9. Swine Diseases

Swine disease research should be accelerated to the level justified by the importance of the industry with special emphasis on:

Enteric infections, especially transmissible-gastro-enteritis, which affects the digestive tract, is caused by a virus. When present, it wipes out practically all pigs less than two weeks of age and all those farrowed in the next two weeks. To date there is no preventive treatment and no cure.

Respiratory disease complex includes such specific diseases as virus pneumonia of pigs, swine influenza, and pasteurellosis. It is believed that virus pneumonia is the world's most important disease of swine -- losses from it in the United States have been estimated to exceed \$100,000,000. Swine influenza is caused by infection with a bacterium and the swine influenza virus acting together. Pasteurellosis rarely occurs as a primary disease but develops along with other ailments at the same time which devitalizes the pig.

Cervical abscesses, resulting from infection of the neck and jowl region but which cannot be detected in the live animal, are causing substantial losses of edible tissue at the time of slaughter. A serious aspect of this problem is that to the extent selling prices of market animals are discounted, the producer of healthy animals must share the burden with producers of infected animals.

Atrophic rhinitis is a transmissible disease of swine characterized by lack of development or loss of the turbinates in the nasal passage. Lesions of this condition are most common in animals from 2 to 5 months of age. The cause has not been completely determined.



Iso-immune-hemolytic-anemia is one for which the cause is not known but which may be the result of genetic predisposition or the result of nutritional factors. It usually occurs in suckling or weanling pigs.

#### 10. Sheep Diseases

Expanded research effort is most urgent for the following:

Epididymitis, an inflammation of the gland attached to the testicle, is caused by an infectious agent. This disease is a frequent cause of sterility in valuable male breeding animals of purebred breeders and range flock owners.

Scrapie, caused by a virus, has an extremely long incubation period - usually about 18 months. The course of disease may vary from 6 weeks to 6 months before the animal dies. This long, slow affliction makes it a very serious disease of sheep.

Foot rot causes the horny wall of the hoof to separate from the tissue beneath and the foot to become deformed. When this occurs in the front feet the sheep usually feed on their knees. It is a serious problem in damp feed lots or wet pastures.

Vibriosis causes abortion in sheep usually after the ewe has been pregnant for a month. Some progress toward development of immunizing agents has been made but further work is needed.

Urinary calculi is a disorder of the kidney and urinary tract comparable to kidney stones in man. The death rate is high.

#### 11. Poultry Diseases

Expanded research effort is most urgent for the following:

Leucosis, which has been the number one killer of poultry for over 30 years, continues to cause a higher mortality among chickens than any other disease. The research needed involves working with a highly infectious virus and the hoped for results may extend over into other areas in veterinary and human medicine, especially human cancer.

Mycoplasma-gallisepticum (air sacculitis) has been responsible for condemnations of chickens and turkeys to skyrocket since compulsory poultry inspection was instituted.

Salmonellosis (especially the paratyphoids) is probably the most important of the avian diseases that are transmissible to man. The paratyphoids, which can infect practically all animal species including man, cause severe losses among young fowl.

## 12. Parasites

Increased effort is needed on gastrointestinal parasites of ruminants with special emphasis on biologic and immunological methods of control and consideration of the problem in mature animals.

## 13. Insects

Increased effort is needed on face flies, horseflies, ticks, screwworms, and mosquitoes with special emphasis on biologic and chemosterilant methods of control.

## 14. Toxicology

Residues of insecticides, herbicides, and radioactive fallout in plant and animal tissues should receive much greater attention because of their public health implications. Plant and animal hormones and their biological and chemical significance should also be thoroughly studied.

## 15. Livestock Disease Incidence Reporting System

A complete reporting system on morbidity and mortality from livestock diseases needs to be established.

## 16. Facilities

(See also the general recommendation pertaining to the Midwest Meat Animal Research Station.)

Beltsville Parasitological Laboratory: Construction of an adequate facility for fireproof housing of the world famous Index Catalogue of Medical and Veterinary Zoology and the Beltsville Parasitological Laboratory parasite collections and sufficient laboratory space for necessary research in all phases of parasitology is needed.

Laboratories at Kerrville, Texas, and Logan, Utah: Complete construction of animal isolation facilities is needed to permit maximum utilization of the research staff.

Regional Poultry Disease Laboratory, East Lansing, Michigan: Additional facilities and equipment are needed, especially an electron microscope and ultra centrifuge to permit extension of research on leucosis.



## B. UTILIZATION RESEARCH AND DEVELOPMENT

An expanding and comprehensive research program covering all aspects of the utilization of animal products is mandatory to assure a healthy and progressive agriculture. Increased domestic and export markets for dairy products, poultry, eggs, meat, wool and mohair, hides and animal fats can be achieved through improved quality, lower processing costs and new product development. Research should be conducted on the composition and properties of the commodities and on modifications that have potential for increasing their value. The committee recommends that greater emphasis on utilization research encompass the following areas:

### 1. Meat

Increased support is needed for basic studies on the chemistry of muscle proteins and connective tissues that will increase our understanding of tenderness and lead to methods for its improvement, for continued research on fat oxidation and meat flavor in order to develop more stable and desirable meat products, and for continued research on meat microbiology in order to devise more stable products and more flavorful cured products. New support is needed for research on the control and elimination of toxigenic micro-organisms that may contaminate meat. New studies are needed on the naturally occurring enzymes of muscle tissue, both those that promote desirable properties and those that produce unwanted changes.

### 2. Milk and Dairy Products

Solution of flavor problems is our greatest need today in achieving increased milk consumption. Increased research attention should be devoted to the flavor chemistry of all dairy products including fluid milk, butter, cheese, milk concentrates and byproducts. A quantitative chemical analysis of the desirable flavors of milk is needed to establish a chemical standard of flavor excellence for all dairy products. The basic chemistry of flavor deterioration should be studied.

Basic research is needed on the physico-chemical behavior of milk constituents by composition, structure and physical equilibria studies designed to lead to increased and improved utilization of conventional dairy products and of the fat, protein, skim milk and whey solids fractions of milk in new and improved products.

### 3. Eggs

In addition to comprehensive research on the protein and lipid components of eggs, further research is needed on the major technological factors influencing quality, stability, wholesomeness, and processing costs of



egg products. Special attention should be given to the maintenance and improvement of functional properties which directly affect the value of egg products and to the development of improved pasteurization treatments for the destruction of Salmonella and other contaminants of egg products.

#### 4. Poultry Meat

The full utilization of poultry requires a better understanding of factors that cause variations in the flavor, tenderness and juiciness of poultry processed into existing and newly developed products by such procedures as dehydration, freezing, irradiation, heat processing, comminuting and formulation into prepared products. Both product properties and process characteristics should be studied.

#### 5. Wool and Mohair

There is need for expansion of current explorations of chemicals and processes which modify wool and mohair to achieve new products, new uses and products with increased convenience in use. Needed are wrinkle resistant lightweight fabrics; fabrics with new desired textures and constructions including stretch fabrics; fabrics with greater and more durable resistance to soils, stains, yellowing, pilling, perspiration, wear and tear, shrinkage, and damage by moths and other insects. There is need to expand the pilot processing facilities for utilization research by adding equipment for mohair processing and for the woolen system of manufacture. There is need to initiate studies of the attributes of blends of fibers, for example, blends of wool and mohair grades and of natural and modified wools and mohair with cotton and synthetics.

#### 6. Hides, Skins and Leather

Improvement in quality and uniformity of leather and greater economies in processing are needed to enhance its competitive position with substitute materials, also development of new products from hide proteins are urgently needed to create new outlets for hides in areas other than the traditional leather markets. To achieve these objectives hide research including histological, physical and chemical evaluation should be expanded to obtain basic information for use in chemical modification, in alteration of the structural and chemical features of collagen, and in the correlation of processing variables with desirable physical properties.

#### 7. Industrial Uses for Animal Fats

Many developments in industrial and nutritional uses for animal fats and oils have met with no more than mediocre success because of the lack of knowledge of the molecular components present. Isolation of the components has been impossible in many instances and their identification difficult because of the great similarity in their molecular structure. Therefore,



research needs to be expanded in isolating, identifying and characterizing the molecular constituents of fats and oils as well as their chemical derivatives. Recent advances in physical methods of measurement and instrumentation offer the possibility for development of the new and better methods which are urgently needed.

New chemical products derived from animal fats show great promise for large volume industrial use in such important industrial marketing areas as plastics, plasticizers, detergents, lubricants and lubricant additives. Research should be expanded to develop increased outlets in these areas and to facilitate the preparation and study of derivatives potentially useful in such large volume markets.

### C. HUMAN NUTRITION AND CONSUMER USE RESEARCH

#### 1. Human Nutrition

This committee approves the program of expanded research in the field of human nutrition as outlined in Senate Document No. 35. The essence of the recommendations in that document are that the present scale of research in food and nutrition is inadequate in light of the Department's responsibilities and the nation's needs. It contains recommendations for three new regional laboratories for food and nutrition research -- in the north-central region, in the southeast, and in the southwest -- and expansion of facilities at the USDA's Research Center at Beltsville, and a substantial increase in the total scientific effort.

We specifically recommend increased support and expansion of research to determine the influence of dietary components upon the use and synthesis of fat by the body at different ages and as they are related to obesity, health and longevity.

Because the life spans and longevity of our people have increased through a combination of good fortunes, our society is finding itself with increasing percentages of elderly people among which group there is an alarming incidence of arthritic, rheumatic, neurotic, diabetic, phlebitic and other similar tendencies, some of which could possibly be induced or aggravated by circumstances of nutrition. Granted this field of inquiry is already receiving some attention by other scientific groups, it still seems of such high reward in service that this Department's scientists, too, are justified in initiating studies along those lines even if only to try to produce in laboratory animals some of the clinical symptoms.

#### 2. Food Consumption Patterns

More detailed food consumption patterns are needed for different age groups and individuals including accurate measurement of waste. These efforts should be expanded to document the consumption of product involved in changing food patterns such as the listing of low-fat milk products separate from non-fat dry milk.



### 3. Cooking Methods for Meat

Further research is recommended on basic cooking methods to correspond with improved breed and quality of animal products and with cutting and merchandising methods now being used.

### 4. Wool Used in Clothing

Research is recommended on the elastic behavior and dimensional stability for drycleaning and laundering of wool knits - including the knits of yarns spun from Wurlanized wool top - typical of those used for such outerwear as womens' dresses, suits and coats. Additional support should be provided to permit inclusion of knits of wool blends and the development of methods for producing seams and edge finishes compatible with the elastic properties of stretch fabrics, both knit and woven, including fabrics consisting entirely of wool and of part-wool.

## D. MARKETING AND ECONOMIC RESEARCH

### 1. Market Quality of Dairy Products

Shelf life of milk products: Research is needed to determine methods of extending shelf life of milk products particularly with respect to the deterioration of milk fats during shelf life.

Protection of dairy products against insects and mites: Insect infestations of nonfat dry milk during processing, storage, and transportation is a serious problem to the dry milk industry and to the government in its price support and school lunch programs. Research needs to be expanded to develop effective preventive and control measures that leave no undesirable chemical residues.

Objective measurement of market quality of dairy products: There is constant need in the dairy industry for rapid, accurate and practical methods for measuring important quality factors in dairy products. Research is needed to develop tests that will meet these needs.

Objective measurement of pesticide and antibiotic residues in milk: Present regulations require that milk and other dairy products be completely free of pesticide and antibiotic residues. Available methods for the analysis of such residues are impractical for use in marketing. This area of research is one of the most pressing problems for the immediate future.

Controlling obnoxious insects in food processing and handling areas: Insects such as flies, roaches and ants are not only obnoxious in food processing and handling areas but may contaminate food with filth and disease. Research has been conducted on the control of these pests in the home and on the farm but little or no work has been done in controlling these insects where food is processed, handled or sold.



## 2. Market Quality of Livestock and Meat

Maintaining quality and shelf life of fresh meat: Considerable research is needed to increase shelf life of fresh meats in addition to present studies on refrigeration and sanitation. A great deal of the future of central cutting and packaging of fresh meats hinges upon successful extension of the shelf life of fresh meats. Studies should include packaging materials and treatment of film and/or meats which will help hold the bloom life of the meat.

Relationship between marbling and tenderness: Research is needed to determine the basic relationship between marbling of muscle tissue and inherent tenderness of the meat and the factors that influence tenderness and the order of importance.

Measurement of market quality factors in meat: Research is needed to establish the characteristics in live meat animals which will aid in the prediction of yields in retail cuts and the genetic association with production traits.

Cutout value of lamb carcasses: Research is needed to determine the cutout value of the lamb carcass when evaluating a live lamb with particular attention to determining the thickness of fat at the 12th rib and determining the size of the loin eye.

Methods for freezing lamb: Research is needed to determine the best methods for freezing lamb carcasses or cuts in order to permit maximum storage time and retain flavor.

Improvement in standards for grades: Improved standards are needed so that livestock growers will receive returns more closely in line with the quality of their products. Such standards will also facilitate better livestock marketing. Research should be designed to extend and improve the grade standards for livestock and meat by developing and applying more nearly objective measures of the quality factors that determine grade and by developing methods for more accurately and quickly estimating the composition of the live animal. The inclusion in the grade standards of other factors relating to flavor and culinary quality, and the relation of conformation of the animal to cutout of the carcass, waste, and quality of the meat should be explored.

## 3. Market Quality of Poultry Products

Objective measures for evaluating the market quality of poultry and eggs: Rapid, simple and reliable tests are needed for use in quality programs for determining whether buyers' specifications are met and for use in grading and inspection programs. There is a lack of sufficient practical and reliable techniques for appraising the quality attributes of a number of poultry products, especially for detecting off-flavors in precooked items.



Poultry inspection criteria and procedures: Research is needed to develop mechanical and other physical aids that would provide greater uniformity and precision in the inspection procedure. The compulsory poultry inspection program has pointed up the need for more information about poultry diseases that may affect the wholesomeness of market poultry. Also, the high level of poultry condemnations focuses attention on the need for establishing additional objective criteria for use in the inspection program.

Quality maintenance of eviscerated poultry: Research should be expanded to determine the effects of different methods of slaughter, scalding, eviscerating, chilling, packaging, freezing, and transporting poultry on such factors as carcass appearance, flavor, tenderness, juiciness and shelf life.

Reducing microbial flora in processed poultry: Research is needed to devise handling and/or packaging techniques that will result in the production and maintenance of poultry meat products of low microbial content without adversely affecting other quality factors. Methods for destroying spoilage organisms that affect poultry meat should be investigated.

#### 4. Market Quality of Wool and Mohair

The committee feels that the effort devoted to this area of work is inadequate and recommends special emphasis on the following:

Improved marketing methods: Methods of marketing wool would be improved if research could help provide (1) determination of the type of bags and twine to use, (2) development of a scourable branding fluid, and (3) determination of the best shipping method (bale, bag or other).

Protection of wool and wool products from insect damage: Current studies need to be expanded on potential nontoxic mothproofing treatments and on ways to fix treatments more firmly to the wool fibers. It is estimated that \$350 million are lost each year because of damage from clothes moths and carpet beetles.

Objective measurement of market quality of wool: Improved methods are needed for quality appraisal of wool. More accuracy in measuring quality factors would contribute to better grading procedures that could relate more closely the product and its processing performance and product quality.

Prevention of insect damage to animal hair and bristle brushes: Methods are needed for treating or packaging brushes and products containing animal hair and bristles from damage by insects. Insect damage, which is often extensive, is not usually found until the item is opened for sale or use because infestation may have occurred during transportation, in warehouses, stock or supply rooms, or on retail shelves.



5. Marketing Facilities, Equipment and Methods for Dairy Products

The committee feels that industry is doing a good job of keeping abreast of developments in this area. However, in view of the requests for help from small firms and some cooperatives a modest effort might be continued but the emphasis should be on advising on problems from an engineering point of view in contrast with duplicating or competing with activities underway in the private sector of the economy.

6. Marketing Facilities, Equipment and Methods for Poultry and Eggs

Processing turkeys: The committee recommends increased research emphasis on improved methods and equipment for further processing of turkeys, cooked rolls, precooked loaf, uncooked breasts, and other final products. This problem is of major immediate importance to turkey processors. It is recommended that additional effort be shifted to this work as other areas of research are phased out.

Cleaning poultry processing plants: Current work methods and equipment used for cleaning poultry processing plants needs to be evaluated for efficiency of operation.

Methods and equipment for slaughtering and defeathering chickens: Improved methods and equipment are needed to prevent the introduction of contaminated scalding water into the birds' air sacs which is a hazard to keeping quality.

Handling efficiency in egg grading and packing plants: Present methods and equipment used in grading and packing plants need to be evaluated to develop improvements that would reduce breakage, hazards to quality and labor requirements.

7. Consumer Packages and Shipping Containers for Dairy and Dairy Products

The committee feels that research needs in this area are being met by private firms and public research should not be used for activities that would compete with or duplicate that of the private sector of the economy. However, a modest effort might be given to evaluating what is being done by industry on the basis that a publicly supported evaluation would have the advantage of objectivity.



## 8. Marketing Facilities, Equipment and Methods for Livestock, Meat and Wool

Layouts and work methods for rendering plants: Engineering research is needed to develop more efficient work methods, equipment and facilities for processing inedible animal byproducts. Automated equipment needs to be evaluated as a means of improving labor efficiency in plants where work methods and equipment are obsolete.

Layouts and work methods for cattle feed lots: Engineering research is needed to develop layouts and work methods for floored and covered cattle feed lots that would minimize operating costs. Uncovered pens with dirt floors require about 200 sq. ft. per animal and during wet weather animals stand in deep mud. It is estimated that covered and floored pens could reduce area requirements to 50 sq. ft. per animal. There is need to obtain data and determine the operating costs under a covered and floored system.

Layouts and work methods for wool warehouses: Engineering research is needed in wool warehouses to develop standards for container size for receiving wool, and packaging for handling, storage and shipment. For many years grease wool has been handled by manual methods with excessive labor costs in warehouses scattered throughout production areas. Some structures are outmoded which make adoption of new techniques impractical.

## 9. Cooperative Marketing Research

Efficiencies of multiproduct dairy plants: Cooperatives are assuming a greater responsibility for handling and manufacturing reserve milk for major fluid milk markets. As a result research is needed to provide information that will enable cooperatives to locate and develop plants of optimum size and flexibility to provide maximum returns to dairymen.

Coordinated marketing by dairy cooperatives: Based on potential application of research now underway, additional research is needed concerning methods of achieving greater horizontal integration of dairy cooperatives thereby improving their performance both on the basis of efficiency of operation and as bargaining agencies.

Cost accounting system for dairy manufacturing plants: Current studies of cooperative manufacturing plants show an increasing scale and complexity of their operations. This points to the need for a uniform accounting system based on departmentalization of operating costs.

Vertical integration and cooperative poultry marketing: Research is needed to determine how poultrymen can take advantage of the economic benefits of vertical integration, especially the contractual type, without incurring undesirable consequences. Study is also needed on the feasibility of coordinated effort between cooperative and other segments of the poultry industry.



Alternatives for selling livestock: Various alternative methods or arrangements for selling livestock need to be studied to determine which will best serve farmers' needs and help them maintain or improve their bargaining strength. These alternatives might include selling on grade and yield basis, livestock grade basis, through contractual arrangements with slaughterers and feeders, or selling on some kind of futures market or forward selling arrangement.

Alternative wool marketing methods and services: Research is needed to determine what kind of marketing services wool growers want and what kind of marketing operations will provide these services most efficiently.

#### 10. Economics of Marketing Dairy Products

Marketing research in the field of milk marketing might be more productive if there were more frequent consultation between agricultural marketing research agencies and private industry. A more frequent exchange of information could help identify (1) marketing changes during early stages, (2) influences affecting the marketing process, and (3) new methods to improve the distributive process.

Geographic price relationships for milk: A concentrated, large-scale study of the relationships between fluid milk prices in the Midwest, the Northeast, and the South is needed in order to analyze the relative competitive advantages of each area and the price differentials which are appropriate to each area. Opinions have been expressed that prices in the Northeast and the South are too high compared with those in the Midwest encouraging increased production in those areas when the milk could be supplied from midwestern areas at lower cost.

#### 11. Economics of Marketing Livestock

The committee recognizes that some demand has been made for research into the effects of retail specials on meat and the resultant effect upon wholesalers, processors and producers. While we do not advise the abandonment of this research, we want to point out this is such an involved area for economic research that we do not think a satisfactory study can be made with the manpower presently available for this work in USDA. We think either a very comprehensive survey encompassing all the many facets and intricacies of this area be made or that it should not be done at all since, at best, it could only be a superficial study with present manpower.



More reliable sources of livestock and meat prices: Research is needed to determine representative sources of data on livestock and meat prices and to suggest methods for more reliable collection and dissemination of market information. Recognition is made of the diminishing importance of terminal market reporting and the need for more realistic methods of reporting livestock transactions.

Reflecting value differences in beef animals: Recognizing the importance of reflecting value differences known to exist in beef animals (back to the producer), we recommend that new and additional research be started on quantitative analysis as applied to beef grading with special emphasis on live animal identification.

Trade practices and livestock prices: The supply and demand for light-weight cattle, which comprise a large part of the beef supply in the South and Southwest, is to an important extent separate from the supply and demand for finished cattle. There is need for market information about prices for meat in the South and Southwest. A description of the markets and market channels in the South and Southwest is needed to provide a basis for estimates of how the existing system of market information in those areas could be improved.

Market potentials for shearlings: Research is needed on the market potentials for shearlings processed with glutaraldehyde, a recent development of utilization research. This new process imparts to lamb skins such added qualities as increased comfort in use, launderability, and dyeing characteristics.

## 12. Economics of Marketing Poultry and Poultry Products

Determining prices of poultry and eggs: Research is needed in determining the commodity prices of eggs and poultry since more of these products are circumventing the terminal market than formerly. There is need for a more accurate reporting system to more thoroughly encompass the majority of egg and poultry transactions.

Bargaining power of poultry and egg producers: Research is needed to evaluate both individual and group action measures which would maintain the economic health of the poultry industry and assure a fair return to producers. This need grows out of the technological changes that have occurred in production, processing and marketing segments of the industry which have given rise to such problems as price instability, oligopolistic and oligopsonistic tendencies, vertical and horizontal integration, and the declining capital accumulation potential of producers.

Economic aspects of product quality: There is need for a study to measure the quality of poultry products at various stages from farm to consumer to determine the causes of variation in product quality and to ascertain the effects of quality programs on costs and returns. This study needs to be related to "Objective measures for evaluating the market quality of poultry and eggs" (page 15).



Retail fryer specials: Research is needed on the effect of retail fryer specials on the wholesale fryer market in general.

### 13. Commodity Situation and Outlook Analysis

Dairy: Research is needed to develop data on the supply and demand for milk and dairy products by structural classifications; more reliable export data; and evaluation of programs of price supports, export assistance, and demand evaluation by various foreign governments. This information should be useful in appraising U. S. Government dairy programs and for estimating the competitive relationship of the U. S. dairy industry in world markets.

Poultry: There is need for an analysis of the factors influencing the level of poultry production and special attention to what appears to be a slowing of the decline in the demand for eggs.

Wool: There is a need for the development of a more comprehensive price reporting basis to obtain clean wool prices at various markets in addition to those reported from Boston. This is needed to reflect the geographically shifting textile industry and the changing buying methods of the mills.

### 14. Supply, Demand and Price of Agricultural Commodities

Basic economic and statistical studies of factors underlying recurring commodity price problems in American agriculture are needed especially in the areas of fed cattle marketings and poultry and eggs.

### 15. Consumer Preference and Quality Discrimination - Household and Industrial

Because some committee members had limited knowledge of this work, they inquired into the history of it. The gist of the background is that it was started in the 1930s to measure farmer reactions to farm programs. In World War II the survey group was used by the military to evaluate different strategies. Following this they were used by the Federal Reserve Board to measure business prospects, that is, what people expected to buy. Following passage of the Research and Marketing Act of 1946 the activities have been devoted to measuring developments in farm products -- textiles, synthetics, poultry, eggs, potatoes, to cite a few -- for the purpose of guiding agricultural groups in planning future market activities with respect to certain products.

The committee feels this is an important area of work and should be continued with emphasis on the following:

Factors influencing consumer use of meats: Research should be conducted to ascertain household consumers' use of and opinions about beef, pork, and lamb, and the factors which influence consumers in their use or nonuse of each of these meats.

Consumer preference for wool products: Research on consumers' attitudes, evaluations, and preferences for wool as compared with other fibers and on consumers' reactions to new developments such as washable wool is needed.

Food fads: An estimated 10 million Americans spend \$500 million a year on quack diets and "hopeful" food fads. Many expenditures are the result of self diagnoses based on fragmentary information or miraculous claims. Many of these purchases are in lieu of nutritious foods needed for good health. These choices made by consumers are of concern to processors and distributors of wholesome agricultural products including milk and meat. Research is needed to discover what attitudes, opinions, and state of knowledge contribute to these choices by consumers. Such information should be of value not only to processors and distributors but to those concerned with nutrition and educational programs.

Consumer quality discrimination: Research is needed on the consumers' ability to discriminate and indicate preferences for selected attributes of quality and flavor in agricultural products such as meat, poultry and dairy products. Information thus obtained would be useful in planning for effective marketing and to give direction for further laboratory research.

Consumer attitude regarding milk products: A survey of the content of nonfat and low-fat milk products now being distributed is needed to determine whether quality is satisfactory to the consumer and to determine whether standards need to be developed.